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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/051,820	WU ET AL.	
	Examiner	Art Unit	
	David Silver	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-10,12-16,18 and 23-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-10,12-16,18 and 23-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 2-10 12-16 and 18 were originally presented for examination.
2. All claims were rejected.
3. Claims 2-10, 12-16, 18, and 23-26 (newly added) are currently pending in Instant Application.
4. The Instant Application is not currently in condition for allowance.

Priority

5. Claimed priority has been acknowledged in previous Office Action.

Response to Arguments

Response: Claim Objections

6. **Applicants argue:**

"Claim 18 was objected to as being of improper dependent form. The claim has amended to properly depend upon independent claim 10." (Remarks: page 9)

Examiner Response:

Objection withdrawn.

Response: 35 U.S.C. § 101

7. **Applicants argue:**

7.1 "Claims 2-10, 12-16 and 18 were rejected under 35 U.S.C.§101 for failure to produce a useful, tangible and concrete result. Applicant's claimed invention provides a software program for automatically calibrating a water distribution model. The set of results generated by the program for calibrating the water distribution model are referred to as calibration solutions.

7.2 Independent claim 2 has been amended herein to indicate that the steps are performed until a user selected desired goodness-of-fit value is obtained resulting in a corresponding calibration solution for calibrating a water distribution model. Claim 10 has been similarly amended. These methods and software processes provide the useful, tangible and concrete result of automatically calibrating a water distribution model." (Remarks: page 9)

8. **Examiner Response:**

The claimed invention remains drawn to software instructions, *per se.* The claimed invention does not provide a practical application. Furthermore, collecting information, calculating, running models (also mere calculations), performing model calibration and repeating those steps until a defined criteria is achieved does not produce a concrete, useful and tangible **final** result as required by MPEP 2106. Specifically, the steps are merely drawn to a software algorithm that does not provide a final result. Applicants' statement in subsection 2 *supra* amount to a conclusionary statement of patentability and is not persuasive.

Claims 23-26 are similarly rejected.

Rejections **maintained**.

Response: 35 U.S.C. § 112

9. **Background:**

"As per claim 3, the claim does not enable one of ordinary skill in the art to make and use the invention because it does not enable weighting factors one of linear, square, square root or log function. Specifically, the specification does provide a vague reference to this terminology but does **not** enable one to make and use the invention. How are these functions applied?"

10. **Applicants argue:**

10.1 "As per claim 3, the Specification clearly states that "the user may deliberately weight the observed data for focusing the calibration on critical data points. In order to do so, the user selects one of four weighting functions which can include ...linear, square, square root and logarithm to conduct the calibration on the weighted, observed hydraulic grade line (HGL) and/or pipe flows ...." (Specification, Page 9, lines 1 - 5). Claim 3 has been amended to clarify that the weighting function is applied to the field observed data.

10.2 Those skilled in the art would thus be enabled to understand the concept of applying the well known weighting functions of linear, square, square root and logarithm to weight critical data points prior to the calculations of the difference between the actual observed data as weighted and the computer generated data."

11. **Examiner Response:**

11.1 Applicants merely stated that the functions are applied to the field observed data. Applicants have not shown that one of ordinary skill in the art would be enabled to make and use the invention without undue experimentation. Specifically, **how** are the weighting functions applied? To simplify the deficiency the following analogy is presented. Merely stating that a quadratic function may be applied to the calculation of gas usage does not explain **how** that function is applied, nor does it provide enablement.

Applicants' statements in subsection 2 *supra* amount to a conclusionary statement of patentability and is not persuasive.

Rejections of claim 3 is **maintained.**

11.2 The 35 U.S.C. § 112 rejections of claims 2, 4-10, 12-16 and 18 have been withdrawn in view of the appropriate amendments and Remarks on page 10.

Response: 35 U.S.C. § 102 (b)

12. **Background:**

Claims 2-5, 7-10, 12-16, and 18 stand rejected under 35 U.S.C. 102(b) as being anticipated by Walters's "Calibration of water distribution network models using genetic algorithms".

13. **Applicants argue:**

13.1 "In Walters, there is a suggestion that artificial throttle valves may have remained in the model by original model builders due to an attempt to manually calibrate the system. This does not anticipate Applicant' s additional calibration parameters of link status and junction demand. Thus, Walters cannot have anticipated Applicant' s claimed invention due to the absence from Walters of the feature of: selecting calibration parameters including link status and one or more of pipe roughness and junction demand.

13.2 Furthermore, the parameter discussed in Walters is pipe roughness coefficient (Walters Page 34, Part 3), and Walters appears to discuss this with reference to refining the GA (genetic algorithm) before the algorithm is performed. It is unclear that Walters is even suggesting that the pipe

roughness is used as a calibration solution in a hydraulic simulation of the model and later to be evaluated as a calibration parameter for the model." (Remarks: page 11 to top of page 12)

13.3 "Walters fails to disclose junction demand information, roughness groups and link status as calibration parameters to be generated by the software program. Walters suggests only a genetic algorithm that involves calculating pipe roughness coefficient values, and does not explain how these are used.

13.4 Furthermore, Walters does not suggest applying a roughness figure to one group of pipes and a different roughness value for a different pipe roughness group.

13.5 Moreover, the feature in Applicant' s claimed invention of including demand loadings (for given times of day) is also absent from Walters.

13.6 Walters mentions demand but not as a calibration parameter to be determined as in Applicant' s claimed invention.

13.7 It is not clear that Walters suggests use of boundary conditions. [...]

13.8 New claim 23 is a claim for a computer implemented method, and it contains limitations that are not taught by Walters, such as link status and demand as calibration parameters to be determined. The sensitivity analysis, historical data and pipe roughness group features of claims 24, 25 and 26, respectively, are also not taught by Walters." (Remarks: bottom of page 12 to page 13)

14. **Examiner Response:**

14.1 Regarding subsection 1 above, Applicants' attention is drawn to **(Walters: page 134 last 6 lines and page 135 top 3 lines)**, which recites:

> **All pipes can have individually variable roughness values, or groups of pipes can be pre-selected to have a common variable roughness, the selection being based on diameter, age, material, location or a combination of these factors. Variables other than pipe roughness could, in principle, be used in the calibration, although this is not common practice. For instance,**

> **neither demands nor pipe diameters may be known precisely, and hence it could be justifiable to allow them to vary to some extent to achieve a good modeling fit.**

From this section, Walters clearly discloses using demand as calibration parameters to calibrate the system. Arguments regarding 'link status' have been addressed in Previous Office Action dated 12/26/06, section 9 subsection "Examiner Response". The Applicants have acquiesced through their silence that the statement that link status is an equivalent of pipe flow.

14.2 Regarding subsection 2 *supra*, Applicants' attention is drawn to the above-citation which clearly demonstrates that pipe roughness is used as a **variable**. The pipe roughness, a variable, is used in the GA, as a calibration parameter; thus, anticipates the claim limitation.

14.3 Regarding subsection 3 *supra*, the statement is a summarization of subsections 1 and 2, and has been addressed above. Regarding the "roughness group", applicants attention is once again drawn to the quoted section above which states that the pipes can be grouped, and have roughness associated therewith; thus, anticipating "roughness group".

14.4 Regarding subsection 4 above, Applicants are arguing features not specifically claimed.

14.5 Regarding subsection 5 above, Applicants attention is drawn to **(Walters: page 135 first full paragraph)**, which recites:

> **Several snapshot simulations are used, generally at maximum and minimum demand times, and at an average time during a typical 24-hour cycle. At each measurement point and for each snapshot, the difference between simulated and observed data (head and/or flow) is calculated, and an overall error value for the whole network is calculated.**

It is evident that Walters indeed includes demand loading for a given time of day (maximum and minimum demand times)

14.6 Regarding subsection 6 above, Walters uses the demand as a parameter (variable / loading condition) in the GA. The GA is used as a calibration. Applicants' attention is drawn to, for example, **(Walters: page 139 paragraph 1)**

> This confirms that the use of only three well defined loading conditions (which represent the minimum, maximum and average water demand) in the optimization is sufficiently robust to obtain a good match for the whole simulation period. An example of a chart comparing field and model profiles is presented in Figure 1.

14.7 Applicants' attention is drawn to, for example, **(Walters: page 139 first paragraph of section 4.5)**, which recites:

> Initial attention focused on flow errors to ensure that these were reasonable, resulting in the identification of an incorrectly specified reservoir level: a bottom water level at 102m had been used instead of 100.2m giving rise to large inconsistencies in flow.

Walters then discloses that the anomalies In the following paragraph Walters discusses that the anomalies were identified and were applied to the model or field data to for "improvement in the results". It is clear that boundary conditions, in this example reservoir levels are disclosed by Walters. Instant Applicant's PGPUB specification paragraph [0019] exemplifies "boundary conditions such as: storage tank levels, pressure control valve settings and pump operation speeds are also entered." The "boundary condition" statement taken from the Specification is not a clear, deliberate, and precise definition, as such the term "boundary condition" takes on its ordinary meaning.

14.8 Regarding subsection 8 *supra*, Applicants' attention is drawn to the responses above.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:
Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

15. Claims 2-10, 12-16, 18, and 23-26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

MPEP 2106 recites, in part:
"...USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the *final* result achieved by the claimed invention is "useful, tangible, and concrete." (emphasis added)

"[A] claim that recites a computer that solely calculates a mathematical formula (see Benson) or a computer disk that solely stores a mathematical formula is not directed to the type of subject matter eligible for patent protection."

The method claims do not produce a useful, tangible, and concrete final result. The steps of the method

claims do not produce a useful, tangible, and concrete result. They merely recite a software algorithm, per se, which, for example, does not display, store, or otherwise provide a useful tangible output. Note exemplary claims 2 and 23 which only recite software steps and does not produce a useful tangible and concrete **final** result. See MPEP 2106 [R-5] (partially recited above).

The claimed invention is drawn to software instructions, *per se*. The claimed invention does not provide a practical application. Furthermore, collecting information, calculating, running models (also mere calculations), performing model calibration and repeating those steps until a defined criteria is achieved does not produce a concrete, useful and tangible **final** result as required by MPEP 2106. Specifically, the steps are merely drawn to a software algorithm that does not provide a final result.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:
The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

16. Claims 2-10, 12-16, and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the **enablement requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

17. As per claim 3, the claim does not enable one of ordinary skill in the art to make and use the invention because it does not enable weighting factors one of linear, square, square root or log function. Specifically, the specification does provide a vague reference to this terminology but does **not** enable one to make and use the invention. How are these functions applied?

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claims 2-5, 7-10, 12-16, and 23-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Walters's "Calibration of water distribution network models using genetic algorithms".

Walters discloses: 2. A method of automatically calibrating a water distribution network, comprising the steps of:

(A) selecting calibration parameters including link status and one or more of, pipe roughness and junction demand **(Abstract. page 139 last para ... valve; page 137 para 2 (section 4.4 para 1) ... partially closed valve; page 135 first full paragraph; page 134 last 6 lines and page 135 top 3 lines; page 139 paragraph 1; page 139 first paragraph of section 4.5)**;

(B) collecting field observed data including pipe flow measurement and a junction pressure measurement for at least one point in the water distribution network, and including corresponding loading conditions and boundary conditions that existed in the network when said field observed data was collected and passing such information to a genetic algorithm module **(page 135 last 2 paragraphs; page 135 first full paragraph; page 134 last 6 lines and page 135 top 3 lines; page 139 paragraph 1; page 139 first paragraph of section 4.5)**;

(C) generating at said generic algorithm module a population of calibration solutions that comprise a set of calibration results, using a genetic algorithm **(page 132 para 3; page 135 first full paragraph; page 134 last 6 lines and page 135 top 3 lines; page 139 paragraph 1; page 139 first paragraph of section 4.5)**;

(D) running multiple hydraulic simulations of each solution to obtain a set of predictions of pipe flows and junction pressures at selected points in the network, corresponding to the loading conditions and associated boundary conditions when the field observed data was collected **(Abstract; page 132 para 1-3 (emphasis on para 3), page 135 para 2)**;

(E) performing a calibration evaluation including computing a goodness-of-fit value for each calibration solution based upon differences between field observed values and said predictions; including

flows and pressure head/water levels **(goodness of fit ... fitness on page 133 para 3)**; and

(F) repeating steps (C) through (E) until a user-selected desired goodness-of-fit value is obtained resulting in a corresponding calibration solution for calibrating a water distribution model **(page 134 para 1; page 137 para 2 (Section 4.4)).**

Walters discloses: 3. The method of automatically calibrating a water distribution model as defined in claim 2, including the further step of:

(A) prior to passing said field observed data to said genetic algorithm module selecting a weighting function for at least one of said field observed data measurements, said weighting function formulated as a weighting factor of observed pressure heads and flows **(page 133 para 1; page 135 para 2)**; and

(B) selecting as said weighting factors one of linear, square, square root or log function of the ratio of individual values for flow or hydraulic pressure to a sum of the observed values of flows or hydraulic pressure **(page 135 para 2; page 133 para 1 and 3; page 134 para 3 "parameter tuning")**; and

(C) applying said weighting function when running said calibration evaluation to determine said goodness-of-fit value **(page 135 para 2).**

Walters discloses: 4. The method of automatically calibrating a water distribution model, as defined in claim 2, including the further step of: selecting as said loading condition, at least one water demand loading at a predetermined time of day, corresponding to a time of day when a field observed data measurement has been made **(page 135 para 2 and last para, page 137 section 4.4 para 3).**

Walters discloses: 5. The method of automatically calibrating a water distribution model, as defined in claim 4, including the further step of selecting multiple loading conditions representing demand loading at various times of day when field observed data measurements have been made **(page 135 para 2 and last para).**

Walters discloses: 7. The method of automatically calibrating a water distribution model as defined in claim 2 including the further step of: after said optimized set of calibration data is obtained, making

manual adjustments to this information for said water distribution model calibration **(page 134 para 3, abstract, page 135 para 2 and last para)**.

Walters discloses: 8. The method of automatically calibrating a water distribution network model as defined in claim 2, including the further step of performing a sensitivity analysis by varying model input parameters over a predetermined range and observing the response thereto of said model **(page 134 para 3)**.

Walters discloses: 9. The method of automatically calibrating a water distribution network model as defined in claim 8 including the further step of adjusting the collection of field observed samples based upon the results of said sensitivity analysis **(page 134 para 3)**.

Walters discloses: 10. A computer readable medium containing executable program instructions for automatically calibrating a water distribution model of a water distribution network that has links that include pipes and junctions, the executable program instructions comprising program instructions for:

(A) generating a graphic user interface by which the user may enter data concerning field observed data, demand alternatives and other information for the network **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**;

(B) a calibration module configured to produce calibration information for a water distribution model constructed from user-selected calibration parameters that include at least one of pipe roughness, junction demand information, roughness groups, and link status **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**;

(C) a genetic algorithm module coupled to said calibration module and said user interface such that information about said calibration parameters, and user-entered field observed data, including field data that include calibration target data and boundary data, said genetic algorithm being configured to produce a population of calibration solutions and said graphic user interface being configured to allow a user to select at least one of goodness-of-fit criteria, a weighting functions, and one or more genetic algorithm parameters **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4, note MPEP 2111.04 regarding statements such as "allow")**; and

(D) a hydraulic network simulation module communicating with said genetic algorithm module such that calibration solutions generated by said genetic algorithm can be run by said hydraulic network simulation module to predict actual behavior of said network, such that predictions are passed back to said calibration module for comparison with field observed data to produce goodness-of-fit values, until a desired goodness-of-fit value satisfying user-selected goodness-of-fit criteria is obtained resulting in a corresponding calibration solution for calibrating a water distribution model **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4).**

Walters discloses: 12. The computer readable medium as defined in claim 10, comprising program instructions for performing the further steps of repetitively computing successive generations of solutions in one or more calibration runs, and calibration solutions are stored for retrieval and evolution. **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4).**

Walters discloses: 13. The computer readable medium as defined in claim 10 further comprising: a database including information regarding water distribution networks for constructing models of said networks, and into which information can be saved **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4).**

Walters discloses: 14. The computer readable medium as defined in claim 10 wherein said user interface further allows a user to enter information regarding alternative demand loadings, representing a demand for water supply at a given point in time, at a given location in the network **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4).**

Walters discloses: 15. A method as described in claim 2 wherein link status is a status of being opened or closed of one or more of pipes, valves and, as being on or off for pumps, in the water distribution model of the water distribution network that is being calibrated **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4).**

Walters discloses: 16. The method as defined in claim 2 further comprising the step of: computing a roughness value, roughness multiplier and identifying link status **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4).**

Walters discloses: 23. (New) A computer implemented method, the method comprising:

calibrating a water distribution model wherein model calibration parameters are generated by providing an initial selection of parameters to be determined including link status and one or more of pipe roughness and junction demand to a genetic algorithm module **(page 135 first full paragraph; in simulations link status is functionally equivalent to pipe flow; Abstract. page 139 last para ... valve; page 137 para 2 (section 4.4 para 1) ... partially closed valve; page 134 last 6 lines and page 135 top 3 lines; page 139 paragraph 1; page 139 first paragraph of section 4.5)**, and performing the steps of:

(A) receiving at said genetic algorithm module, said selected parameters and field observed data, and generating at said genetic algorithm module a calibration solution for said calibration parameters **(abstract; page 132 paragraph 1)**;

(B) receiving said calibration solution at an associated hydraulic simulation module and running a hydraulic simulation of the model using said calibration solution **(abstract; page 132 paragraph 1)**;

(C) producing as a result at said hydraulic simulation module, a set of predictions of junction pressures and pipe flows for nodes in a water distribution model for said calibration solution **(abstract; page 132 paragraph 1; page 137 table 3 and section 4.4 in general; page 135 last 2 paragraphs; page 135 first full paragraph; page 134 last 6 lines and page 135 top 3 lines; page 139 paragraph 1; page 139 first paragraph of section 4.5)**;

(D) passing said predictions for that calibration solution to an associated calibration module to evaluate how closely the predictions are to field observed data and assigning a goodness of fit value to that calibration solution **(page 132, paragraph 1 "reaching a good calibration"; page 139 paragraph 1; page 140 section 5 "better fit")**;

(E) repeating steps A through D a plurality of times and passing the goodness of fit value to a genetic algorithm module for each solution **(page 140 section 5 "iterative process" / "better fit")**; and

(F) calculating at said genetic algorithm module, solutions that correspond with a minimum

discrepancy between the simulated predictions and the observed data to obtain a desired set of calibration parameters for use in calibrating a water distribution model **(Abstract paragraph 2; page 134 paragraph 2 "lower cost solutions" / convergence).**

Walters discloses: 24. (New) The method as defined in claim 23 including the further step of performing a sensitivity analysis by varying parameters for a roughness, demand and link status over a predetermined range and observing the relative change in the model response thereto **(page 135 line 1 to second full paragraph).**

Walters discloses: 25. (New) The method as defined in claim 23 including the further step of matching the model to historical field conditions **(page 131 (title page); paragraph 1" modeling the system until a satisfactory match is obtained between modeled and observed values").**

Walters discloses: 26. (New) The method as defined in claim 23 including the further step of assigning a selected group of pipes to be in a particular roughness group and assigning a roughness calibration variable being one of a roughness coefficient or a roughness coefficient multiplier as the roughness calibration parameter for that roughness group **(page 134 section 3 paragraph 1: "all pipes can have individually variable roughness values, or <u>groups</u> of pipes can be pre-selected to have a common variable roughness").**

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

19. Claims 6 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walters's "Calibration of water distribution network models using genetic algorithms" in view of Official Notice

taken.

As per claim 6, Walters discloses: The method of automatically calibrating a water distribution model as defined in claim 1 wherein said boundary conditions include pressures control valve settings and pump operation speeds **(page 139 last para; page 140 first para)**. Walters however does not expressly disclose that the boundary conditions include water storage tank levels. Official Notice is taken with respect to this limitation. It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to combine the references in order to have a more detailed and realistic model that would encompass more variables on the boundary conditions. This motivation and feature is displayed in ATSDR's "Summary of Findings" **(page 2 para 1)**.

As per claim 18, Walters fully discloses all limitations of claim 10. Walters however does not disclose program instructions for performing the further steps of terminating a calibration run to determine intermediate values and pausing and resuming said calibration run. Official Notice is taken with respect to this feature. It would have been obvious to one of ordinary skill in the art <computer and water engineering / simulation / modeling> at the time of Applicant's invention to combine the features in order to allow for data to be saved and used at a later time or location. This is especially advantageous when the simulation is moved to a faster computer or saved in event of power failure; thus reducing the time and costs associated with re-running the simulation from the beginning.

Conclusion

20. All claims are rejected.

21. The Instant Application is not currently in condition for allowance.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action (new claims). Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date

of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be reached on Monday thru Friday, 10am to 6:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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